

the total losses. Very destructive lightning fires occasionally occur, as, for example, the million-dollar elevator fire in Baltimore in 1922.

Before these index numbers can be fully interpreted, information should be available giving accurately the proportionate losses occurring in town and rural sections, and, probably more important, it is desired to know what percentage of the total number of farm buildings in each State is protected against lightning by rodding. Such information could be included in the next census.

# TORNADO OF JUNE 22, 1923, AT FORT YATES, N. DAK.

By A. MCG. BEEDE

On June 22, 1923, about 5 p. m., at Fort Yates, N. Dak., it was raining lightly and thundering, breeze southwest. My son called my attention to certain clouds about five miles away, up high, very black, and thrusting downward something shaped like a huge fan, wide end upward in the clouds. The clouds were slowly circling around and slowly moving northeastward (and so nearer to Fort Yates). This continued for 10 minutes, while the cloud mass had moved forward about three miles, and meanwhile the downthrust, always fan-shaped, had been made a dozen times and then taken up into the cloud. None of these downthrusts had reached the earth, though each one created wind disturbances under it on the earth.

Then a streaming, gray downthrust very rapidly extended nearly to the earth, about two miles southwesterly from Fort Yates, and there was great disturbance on the earth under it. In a moment it was lifted again, although the cloud mass had not lowered at all between clouds and sunshine. This was repeated three times while the cloud mass was rather slowly circling around and moving northeasterly. These three downthrusts were one minute apart.

Just then a streamer extended quickly to earth, about 1½ miles from Fort Yates. It was a slender streamer, light gray in color. As it touched the earth there arose around it a funnel-shaped vortex, very small on the earth and enlarging at an angle of about 15 degrees, whirling around more slowly than some others I have seen; the funnel arose about 200 feet above the earth, while in its center and extending upward to the high clouds, the streamer could be seen, the cloud still circling around and moving northeasterly toward the cloud over the Missouri River. Then this slight streamer was taken up into the cloud with the vortex following it, and disappeared. All this had been done in about one-fourth of a minute.

The vortex pulled up bushes and grass and some dirt, and spewed this material over an area many times wider than the vortex. The next downthrust, half a minute later, was larger and as rapid, reaching the earth about 300 yards onward from the last thrust mentioned. Its behavior, funnel and all, was like its predecessor, only more forceful. Then came a third thrust to earth, in a large bunch of bullberry trees, some of them 4 inches in diameter and deeply rooted, and it pulled them all up by the roots like weeds, drawing them up in the funnel, whence they were spewed out. This funnel was 300 to 500 feet high, but still the angle of the sides was about 15 degrees. There were nine more downthrusts to the earth

in rapid succession, while the upper cloud did not lower at all, but kept on a level with the great cloud it was approaching.

Finally, the tornadic cloud reached the great cloud, which was moving up river all the time very slowly, and just as this happened, a last streamer was thrust halfway down to the earth, just westerly from the Congregational mission, and under it barrels and unsawed poles and all movables went whirling around and abroad in every direction. It was thundering near and heavy all of the time, but I saw no lightning, and there was not much rain, but a few scattering drops only, and the surface of the earth was rather dry, though just below the surface it was saturated with water. As the two clouds merged the combined cloud mass quickening its slow movement, moved up river, away from the river north by a little westerly over the old town of Fort Yates, and over St. Peter's church. At about this time there was another tornado over west in Grant County.

As the next to last full streamer went down numerous crows appeared in the vortex and were whirled around, but I did not see any of them fall, nor were dead crows there later. I did not see the crows fly into the vortex, but saw them about 100 flying and twirling in it. Perhaps they were taken up from where they had taken refuge, in a bunch of bushes.

There was no damage, because nothing was in the tornado's path to be damaged.

Old Indians claimed that whenever there is a whirlwind on the earth tossing leaves and grass and dust, there is a ghost-like streamer from on high which the eyes of some persons can see. They called this streamer "Amakpiya—ta nagi clouds—ghost."

EDITOR'S NOTE.—The rather faintly developed tornado described by Mr. Beede occurred in the southern quadrant of a cyclonic system centered at 8 a. m. 75th meridian time over Manitoba; its entire southern half was a region of thunderstorms and squall winds. Mr. Beede describes what apparently was a tornado of slight intensity that developed in the general storm area.

# TORNADO AT NORTHFIELD, MINN., MAY 3, 1922

By U. G. PURSELL, Meteorologist

[Weather Bureau Office, Minneapolis, Minn.]

A small tornado of little violence apparently developed a short distance west of Northfield about 7 p. m. May 3, pursued a path approximately in a northeast direction, about 4 miles in length, and disappeared soon after crossing the hill upon which St. Olaf College of Northfield stands. The damage was confined to the wrecking of small farm buildings, barns, and garages.

The funnel cloud was seen by a number of people in Northfield and was photographed by several persons. We are indebted to Mr. Martin N. Ayre and Mr. Paul J. Orebo respectively, for the two prints reproduced in Figures 1 and 2 below. Unfortunately the details of the two views are not known, the first named (Fig. 1) was evidently made from a point nearer to the funnel cloud than the second. Both photographs must have been made about 7 p. m. The photograph by Mr. Ayre was taken at one-quarter to one-third mile; Mr. Orebo's was more distant.





FIG. 1.—Funnel cloud in tornado of May 3, 1922, at Northfield, Minn. (Photograph by Martin N. Ayre.)



FIG. 2.—Funnel cloud in tornado of May 3, 1922, at Northfield, Minn., about 7 p. m. (Photograph by Paul J. Orebo.)